

Soal Latihan 4.1

3. $f(x) = \begin{cases} \frac{1}{x}, & x \geq 1 \\ -3x, & x < 1 \end{cases}$

a. $f(-1) = -3(-1) = 3 //$ d. $f(\frac{1}{7}) = \frac{1}{(\frac{1}{7})} = \frac{1}{7} //$

b. $f(\frac{1}{2}) = -3(\frac{1}{2}) = -\frac{3}{2} //$ e. $f(\frac{2}{3}) = -3(\frac{2}{3}) = -2 //$

c. $f(0) = -3(0) = 0 //$ f. $f(t^2+1) = \dots$

$\hookrightarrow f \cdot f(t^2+1) = \begin{cases} \frac{1}{t^2+1}, & t^2+1 \geq 1, t^2 \geq 0 \\ t^2+1, & t^2+1 < 1, t^2 < 0 \text{ (TM)} \end{cases}$

6. $f(t) = \begin{cases} t^2-1, & t \leq 0 \\ t-1, & t > 0 \end{cases}$

a. $f(x^2) = \dots$

$\rightarrow$ Ketika $x^2 \leq 0$

$f(x^2) = x^4 - 1$

$\rightarrow$ Ketika $x^2 > 0$

$f(x^2) = x^2 - 1 = (x+1)(x-1)$

b. $f(x+1) = \dots$

$\rightarrow$ Ketika $x+1 \leq 0 \rightarrow x \leq -1$

$(x+1)^2 - 1$

$f(x+1) = (x+1+1)(x+1-1)$

$= x(x+2)$

$\rightarrow$ Ketika $x+1 > 0 \rightarrow x > -1$

$f(x+1) = (x+1) - 1$

$= x$

c. $f(2x) = \dots$

$\rightarrow$ Ketika $2x \leq 0 \rightarrow x \leq 0$

$f(2x) = (2x)^2 - 1$

$= 4x^2 - 1$

$\rightarrow$ Ketika $2x > 0 \rightarrow x > 0$

$f(2x) = 2x - 1$

d. $f(1-x^2) = \dots$

$\rightarrow$ Ketika $1-x^2 \leq 0$
 $x^2 \geq 1$

$f(1-x^2) = (1-x^2)^2 - 1$
 $= (1-x^2+1)(1-x^2-1)$
 $= (2-x^2)(-x^2)$
 $= x^4 - 2x^2$

$\rightarrow$ Ketika $1-x^2 > 0$
 $x^2 < 1$

$f(1-x^2) = 1-x^2 - 1$
 $= -x^2$

e. $f(2x-1) = \dots$

$\rightarrow$ Ketika $2x-1 \leq 0$
 $x \leq \frac{1}{2}$

$f(2x-1) = (2x-1)^2 - 1$
 $= (2x-1+1)(2x-1-1)$
 $= 2x(2x-2)$
 $= 4x(x-1)$

$\rightarrow$ Ketika $2x-1 > 0$
 $x > \frac{1}{2}$

$f(2x-1) = (2x-1) - 1$
 $= 2x - 2$
 $= 2(x-1)$

7). Dapatkan Domain dan Range :

(a). $f(x) = \frac{1}{\sqrt{x-4}}$

$\rightarrow$ Domain : $\sqrt{x-4} \neq 0$ $x-4 > 0$
 $x-4 \neq 0$ $x > 4$
 $x \neq 4$

$\rightarrow$ Range : $x > 0, x \in \mathbb{R}$

Jawab : $\rightarrow D_f = \{4, +\infty\}$

$\rightarrow R_f = (0, +\infty)$

(b). $f(x) = \frac{1}{x-3}$

$\rightarrow$ Domain : $x-3 \neq 0$ $x \neq 3$ $\rightarrow$ Range : $y \neq 0, y \in \mathbb{R}^1$

Jawab : $\rightarrow D_f = \{x \neq 3\}$

$\rightarrow R_f = \{y \neq 0\}$

14. $f(x) = \sqrt{x+3}$ $f(g(x)) = 3|x|$ $g(x) = \dots$

$f(g(x)) = \sqrt{g(x)+3}$

$\rightarrow \sqrt{g(x)+3} = 3|x|$

$\sqrt{g(x)+3} = 3\sqrt{x^2}$

$g(x)+3 = 9x^2$

$g(x) = 9x^2 - 3$

$= 3(3x^2 - 1)$

► Soal Latihan 4.3

5. Bentuk awal $\rightarrow f(x) = |x|$

• Digeser 2 satuan ke kanan

• Digeser 4 satuan ke atas

• Diambil dp yang bawah

$\rightarrow f(x) = |x-2|$ (digeser 2 ke kanan)

$\rightarrow f(x) = |x-2| + 4$ (digeser 4 ke atas)

$\rightarrow f(x) = -|x-2| + 4$ (diambil daerah penyelesaian yang bawah)

Jawab: $f(x) = -|x-2| + 4$

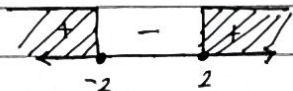
11. Gambar Sketsa grafik fungsi

a). $g(x) = \sqrt{x^2 - 4}$

• $x^2 - 4 \geq 0$

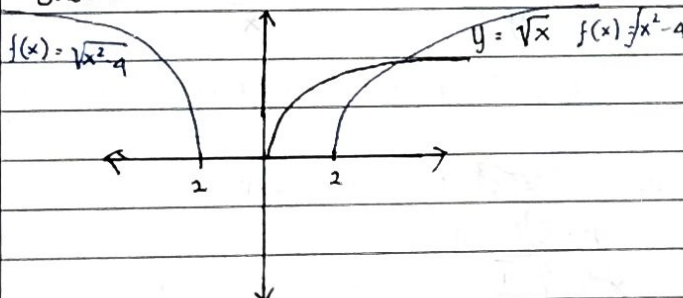
• $(x+2)(x-2) \geq 0$

$x = -2 \vee x = 2$



Domain = $(-\infty, -2] \cup [2, +\infty)$

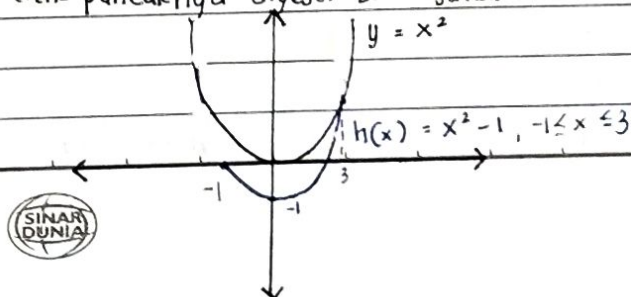
Sketsa :



b). $h(x) = x^2 - 1$, $-1 \leq x \leq 3$

Grafik asal = $y = x^2$

Grafik $h(x) = x^2 - 1$ adalah grafik $y = x^2$ yang titik puncaknya digeser satu satuan ke bawah

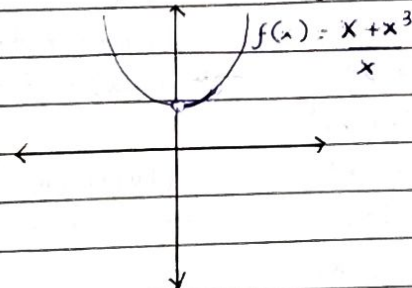


c). $f(x) = \frac{x+x^3}{x}$, $x \neq 0$

$= \cancel{x} (1+x^2)$

$= 1+x^2$

$\rightarrow$ Grafik x^2 naik 1 satuan



12). Diket: $f(2) = 7.000$ $f(1) = 5.000$

Ditanya: $R(t)$

Jawab: $R(t) = at + b$

$\rightarrow R(2) = 2a + b = 7.000$

$R(1) = a + b = 5.000$

$a = 2.000$

$R(t) = at + b$

$R(1) = a + b = 5.000$

$b = 5.000 - 2.000$

$= 3.000$

$R(t) = 2.000t + 3.000$

Jawab: $R(t) = 3.000 + 2.000t$

16). $f(x) = x^2 - 1$; Gambar sketsa grafik

untuk $y = \frac{1}{2} (f(x) - |f(x)|)$

$y = \frac{1}{2} (x^2 - 1 - |x^2 - 1|)$

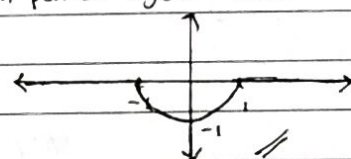
$|x^2 - 1| \begin{cases} x^2 - 1 \geq 0 \rightarrow (x+1)(x-1) \\ -x^2 + 1, x^2 - 1 \leq 0 \end{cases}$

$(x+1)(x-1) \leq 0$

Saat $x \leq -1 \rightarrow y = 0$

Saat $x \geq 1 \rightarrow y = 0$

Saat $-1 < x < 1 \rightarrow y = f(x)$ (Grafik x^2 dengan puncak digeser 1 satuan ke bawah)



17). Luas $\rightarrow$ Integral

$L(c) = \begin{cases} \int_0^c 3c \, dc \\ = \frac{1}{2} 3c^2, 0 \leq c \leq 2 \end{cases}$

$\int_2^c 6 \, dc = 6c, c > 2$

1. Soal Latihan 4.4

5. Fungsi Genap $f(-x) = f(x)$
 Fungsi Ganjil $f(-x) = -f(x)$
- a. $f(x) = x^2 \rightarrow f(-x) = f(x)$
 $f(-x) = (-x)^2 = x^2$ (Fungsi Genap).
- b. $f(x) = x^3 \rightarrow f(-x) = -f(x)$
 $f(-x) = (-x)^3 = -x^3$ (Fungsi Ganjil).
- c. $f(x) = |x| \rightarrow f(-x) = f(x)$
 $f(-x) = |-x| = |x|$ (Fungsi Genap).
- d. $f(x) = x - x^2 \rightarrow f(-x) \neq f(x)$
 $f(-x) = -x - (-x)^2 = -x - x^2$ (Tidak keduanya).
- e. $f(x) = 2 \rightarrow f(-x) = f(x)$
 $f(-x) = 2$ (fungsi genap)
- f. $f(x) = \frac{3x^2}{x-1} \rightarrow f(-x) \neq f(x)$
 $f(-x) = \frac{3(-x)^2}{-x-1} = \frac{3x^2}{-x-1}$ (Tidak keduanya).

10. Grafik yang punya grafik simetrik terhadap sb. y = ... (pilih jawaban benar)

Simetrik Sumbu y $\Rightarrow f(-x) = f(x)$

A. $f(x) = |x-2|$
 $f(-x) = |(-x)-2| = |-x-2|$ (SALAH)

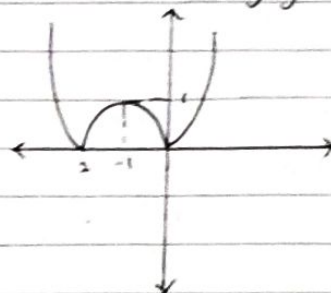
B. $f(x) = (x-2)^2$
 $f(-x) = (-x-2)^2$ (SALAH)

C. $f(x) = |2-x|$
 $f(-x) = |2+(-x)| = |2-x|$ (SALAH)

d. $f(x) = \sqrt{2-x^2}$
 $f(-x) = \sqrt{2-(-x)^2} = \sqrt{2-x^2}$ (BENAR)

e. $f(x) = (x+2)^2$
 $f(-x) = (-x+2)^2$ (SALAH)

11. Sketsa Gambar ini adalah grafik dari



Grafik awal $= x^2$. Titik puncak digeser 1 satuan ke kiri dan satu satuan ke bawah

$\rightarrow y = (x+1)^2 - 1$, Karena semua nilai y ada diatas garis sumbu x, maka:
 $y = |(x+1)^2 - 1|$

15. $y = g(x)$ adalah pencerminan $y = \sqrt[3]{x-2}$ terhadap sb. y. Rumus g = ...

Dicerminkan Sumbu y $\rightarrow x = -x$

$y = \sqrt[3]{(-x)-2}$
 $= \sqrt[3]{-x-2}$

1. Soal Latihan 4.5

1. Tentukan apakah f dan g merupakan pasangan fungsi - fungsi invers.

a. $f(x) = 2x$ $g(x) = \frac{1}{2}x$
 $y = 2x$
 $x = \frac{y}{2} \rightarrow f^{-1}(x) = \frac{x}{2}$

Jadi f dan g adalah pasangan Fungsi Invers

b. $f(x) = 7x - 4$ $g(x) = 4 - 7x$
 $y = 7x - 4$
 $\frac{y+4}{7} = x$ $f^{-1}(x) = \frac{x+4}{7}$

Jadi, f dan g bukan pasangan fungsi invers

c. $f(x) = \sqrt[3]{x-6}$ $g(x) = x^3 + 6$
 $y = \sqrt[3]{x-6}$ $f^{-1}(x) = x^3 + 6$
 $y^3 = x - 6$
 $x = y^3 + 6$

Jadi, f dan g adalah pasangan Fungsi Invers

d). $f(x) = \sqrt[4]{x}$; $g(x) = x^4$

$y = \sqrt[4]{x}$

$y^4 = x \rightarrow f^{-1}(x) = x^4$

kapi, $g(x) = x^4$

$y = x^4$

$x = \pm \sqrt[4]{y}$

Jadi, f dan g bukan pasangan Invers

5) $f(x) = x^4 + 2$, $x \geq 0$

$y = x^4 + 2$

$y - 2 = x^4$ Domain = $x \geq 2$

$x = \pm \sqrt[4]{y-2}$

$f^{-1}(x) = \pm \sqrt[4]{x-2}$, dengan $x-2 \geq 0$
 $x \geq 2$

b). $f(x) = -\sqrt{2-7x}$ $f^{-1}(x) = \frac{2-x^2}{7}$

$y = -\sqrt{2-7x}$

$y^2 = 2-7x$

$y^2 - 2 = -7x$

$x = \frac{2-y^2}{7}$

Domain : $2-7x \geq 0$

$7x \leq 2$

$x \leq \frac{2}{7}$

c). $f(x) = \sqrt{x+6}$ $f^{-1}(x) = x^2 - 6$

$y = \sqrt{x+6}$

$y^2 = x+6$

$x = y^2 - 6$

Domain = $x \geq \sqrt{6}$

d). $f(x) = -\sqrt{3-2x}$ $f^{-1}(x) = \frac{3-x^2}{2}$

$y = -\sqrt{3-2x}$

$y^2 = 3-2x$

$y^2 - 3 = -2x$

$x = \frac{3-y^2}{2}$

Domain = Range $f(x)$

$= x \leq 0$

7. $f(x) = \frac{x^3}{x^2+1}$, $f^{-1}(x) = 2$, $x = \dots$

$f(2) = x \rightarrow \frac{2^3}{2^2+1} = \frac{8}{4+1} = \frac{8}{5}$

Jadi $x = \frac{8}{5}$

12. Dapatkan $f^{-1}(0)$ dan range f^{-1} . Dari fungsi

$f(x) = \frac{x^4-1}{x+1}$

$f^{-1}\left(\frac{x^4-1}{x+1}\right) = x$

$\frac{x^4-1}{x+1} = 0$

$x^4 = 1$

$x = \pm 1 \sqrt[4]{-1} (TM)$

(M)

Range $f^{-1} = \dots$

$1; x+1 \neq 0$

$x \neq -1$

Jawab = (A)

15). $f(x) = -\sqrt{4-7x}$ $f^{-1}(x) = \frac{4-x^2}{7}$

$y = -\sqrt{4-7x}$

$y^2 = 4-7x$

$\frac{y^2-4}{-7} = x$

Jawab = A. $f^{-1}(x)$

$= \frac{1}{7}(4-x^2), x \leq 0$

(A)

17). $f(x) = \sqrt{1-x^2}$, domain $0 \leq x \leq 1$.

Selesa f dan $f^{-1} = \dots$

$y = \sqrt{1-x^2}$

$y^2 = 1-x^2$

$x^2 = 1-y^2$

$x = \pm \sqrt{1-y^2}$

$f^{-1}(x) = \pm \sqrt{1-x^2}$